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TITLE: Adhesive compositions and adhesive sheets

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US-CL-CURRENT: 428/343,428/355R

ABSTRACT:

The present invention aims to provide an adhesive composition showing high adhesion and cohesion as well as good heat resistance. Adhesive compositions of the present invention include an imide (meth)acrylate, a monomer having a glass transition temperature of -50.degree. C. or less when it is homopolymerized, and a photoinitiator, wherein the content of the imide (meth)acrylate is 1-20 parts by weight per 100 parts by weight of the monomer.

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Current US Classification, US Primary Class/Subclass - CCPR:

428/343

Current US Classification, US Secondary Class/Subclass -

CCSR:

428/355R

Summary of Invention Paragraph - BSTX:

[0002] Generally, one-pack solvent-free acrylic adhesive compositions that contain monomer as polymerization component and initiator, comprise a hard segment component showing a relatively high glass transition temperature (Tg) (e.g., about 60 to 180.degree. C.) and conferring high cohesion on adhesives (such as acrylic acid, methyl methacrylate, etc.), a soft segment component showing a relatively low glass transition temperature (eg, about -90 to -20.degree. C.) and conferring high adhesion on adhesives (such as butyl acrylate (Tg=-54 .degree. C.), 2-ethylhexyl acrylate (Tg=-85.degree. C.), etc.), a component showing an intermediate glass transition temperature (e.g., about -20 to 60.degree. C.) (such as t-butyl acrylate (Tg=41.degree. C.), vinyl acetate, etc.), and a photoinitiator. The acrylic adhesive composition is cured by irradiation to show adhesive properties (JPA No. 2000-073025, etc.).

Detail Description Paragraph - DETX:

[0021] For the major component, if a monomer having a glass transition temperature (Tg) higher than -50.degree. C. when it is homopolymerized is used, the tackiness is lowered. Thus, it is preferable to use a monomer showing a glass transition temperature (Tg) of -50.degree. C. or less when it is homopolymerized as a major component. Such monomers preferably include esters of an acrylic acid with an alkyl alcohol containing 4 to 14 carbon

atoms, specifically butyl acrylate (Tg of homopolymer=-54.degree. C.), n-propyl acrylate (Tg of homopolymer=-52 .degree. C.), 2-ethylhexyl acrylate (Tg of homopolymer=-85.degree. C.), nonyl acrylate (Tg of homopolymer=-85.degree. C.), isooctyl acrylate, lauryl acrylate, etc. Among them, 2-ethylhexyl acrylate is especially preferred because it has a low glass transition temperature and it is available at low cost.

Detail Description Paragraph - DETX:

[0027] Such copolymerizable compounds with homopolymerizable monomer, include monomers having a glass transition temperature above -50.degree. C. when it is homopolymerized, e.g., acrylic acid (Tg of homopolymer=90.degree. C.), acrylic acid esters of cyclic alkyl alcohols and alkyl alcohols containing 3 or less carbon atoms (Tg of homopolymer=-5.degree. C.), and acrylic acid derivatives such as ethyl acrylate (Tg of homopolymer=-22.degree. C.), 2-hydroxyethyl acrylate (Tg of homopolymer=-15.degree. C.), isobomyl acrylate (Tg of homopolymer=90.degree. C.), morpholine acrylate (Tg of homopolymer=145.degree. C.), etc. Oligoester acrylates such as phenoxydiethylene glycol acrylate (Tg of homopolymer=-25 .degree. C.) may also be used. Especially, acrylic acid, isobomyl acrylate and morpholine acrylate can be preferably used.

Detail Description Paragraph - DETX:

[0035] Next, active energy rays (e.g., UV rays) irradiate the surface of the applied layer 12. The homopolyerizable monomer and imide (meth)acrylate are copolymerized, and the adhesive composition comprising the applied layer is cured.

Detail Description Paragraph - DETX:

[0036] Reference numeral 13 of FIG. 1(c) designates an adhesive layer comprising a cured applied layer 12. An adhesive sheet 10 comprises the adhesive layer 13 and the base sheet 11.

Detail Description Paragraph - DETX:

[0038] Reference numeral 21 of FIG. 2(a) designates a release sheet. An applied layer 22 comprising the adhesive composition on the surface of the release sheet using the same process as mentioned-above, and then, irradiating active energy rays to some degree that the applied layer is not cured completely. The adhesive composition comprising the applied layer 22 is semi-cured (the semi-cured state, hereinafter referred to as B staged).

Detail Description Paragraph - DETX:

[0040] FIG. 2(c) shows a state that the base sheet 25 is adhered to the applied layer 23. At least one of the release sheet 21 and base sheet 25 have a light transmission. When an active energy ray irradiates to the sheets 21 and 25 having a light transmission, the light transmits through the sheets 21 and 25, and the light reaches to the B staged applied layer. The copolymerization of the monomer and imide (meth)acrylate in the applied layer 23 is advanced by the sufficient irradiation of the light to the B staged applied layer 23, and in the result, the applied layer is cured completely.

Detail Description Paragraph - DETX:

[0041] Reference numeral 26 designates an adhesive layer of

which the applied
layer 23 is completely cured. The adhesive layer is formed in a film-shape by
curing. The adhesive layer 26 can be used as a non-support type adhesive sheet
when the base sheet and the release sheet are removed from the adhesive layer
26 as shown in FIG. 2(e).

Detail Description Paragraph - DETX:

[0044] Liquid UV-curable adhesive compositions were prepared for the examples 1
to 7 and comparative examples 1 and 2, by homogeneously mixing components shown
in below-described Table 1 by a standard method.

Detail Description Paragraph - DETX:

[0047] Next, a transparent PET (polyethylene terephthalate) film having a
thickness of 50 .mu.m treated with silicone on one side was applied thereon was
prepared for base sheet 25. The silicone treated surface of the base sheet 25
was superposed to the surface of the B-staged applied layer 23. The assembly
was compressed between two rolls so that the applied layer 23 had a thickness
of 50 .mu.m. Thus obtained laminate was irradiated with light from a UV lamp
(dominant wavelength: 365 nm, 50 mW/cm.sup.2) at the PET film side to
completely cure the applied layer 23. The release paper 21 and the PET film
were removed to prepare nine types of non-supported adhesive sheet comprising
adhesive layer 26. Nine types of test pieces are formed with thus obtained
nine types of adhesive sheet and stainless steel sheets (SUS306), according to
"13. Holding power" of JIS Z0237. The holding power (mm) was measured using
these test pieces at the condition of measurement atmosphere 80.degree. C. and
load 1 kg weight (9.8 N).

Detail Description Paragraph - DETX:

[0049] The cured adhesive composition (adhesive sheet) by irradiating of light as above-mentioned process, wasput between a surface material and an adhered body. The surface material and the adhered body were adhered to the adhesive sheet under a load of 10 N/cm, thus obtaining the test pieces.

Claims Text - CLTX:

5. An adhesive sheet comprising an adhesive layer, wherein the adhesive layer comprises a cured adhesive composition, and wherein the adhesive composition comprises imide (meth)acrylate and homopolymerizable polymer and photoinitiator, wherein a glass transition temperature of the homoplymerizable monomer is -50.degree. C. or less when it is homopolymerized, and the content of the imide (meth)acrylate is 1 to 20 parts by weight per 100 parts by weight of the homopolymerizable monomer.